THE VETERINARY RECORD

FOUNDED BY WILLIAM HUNTING, F.R.C.V.S., 1888.

No. 23. JUNE 9, 1945 VOL. 57.

Some Factors in the Aetiology and Diagnosis of Bovine Infertility*

J. A. LAING †

SCHOOL OF AGRICULTURE, CAMBRIDGE

The latest detailed information concerning the incidence of infertility in this country is contained in the Report of the Economic Advisory Council's Committee on Cattle Diseases (1934) which, basing its findings on three surveys made at Reading, Cambridge and in Ayrshire, stated that "of the annual 22·5 per cent. wastage in dairy cows, 26·8 per cent. resulted from diseases of the reproductive system." The statistics available give no indication as to the incidence of different types of infertility and no suggestion as to causes.

It is generally considered (N.V.M.A. Survey Committee, 1941) that the chief cause of infertility is endometritis of various types, usually secondary to *Br. abortus* infection, and the treatment usually adopted is irrigation of the uterus with solutions of iodine of various strengths. The N.V.M.A. Survey Committee's Report stated that not more than 10 per cent. of all causes of sterility in average herds is due to "physiological derangement," and that 80 per cent. of the loss from infertility was preventable.

This view that endometritis is the chief cause of infertility is based mainly on the work of Nielsen (1926), who stated that in herds infected with *Br. abortus* the incidence of infertility was much higher than in uninfected herds, and that this was due to the greater facility in such herds for bacterial infection of the genital tract to occur following abortion and retention of the placenta. Such infections occurred in brucella-free herds, but were less common. They resulted in metritis, which, basing his classification on an earlier one of Richter (1922), Nielsen divided into *endometritis puerperalis*—inflammation of the uterus occurring during the first three weeks *post-partum*, and chronic endometritis of the first, second, third and fourth degrees. First degree endometritis he defined as chronic catarrhal endometritis, in which there might be no clinically detectable change in the genital organs, or where there might be slight enlargement of the uterus and sometimes slight abnormal uterine discharge. He stated that, in many cases, diagnosis of first stage endometritis could be based only on a history of unsuccessful service, as no clinical signs of inflammation occurred. His endometritis of the second degree—a chronic catarrhal, muco-purulent or purulent endometritis, was characterised by enlargement of the uterus, relaxation of the cervix and secretion of abundant mucus containing pus. Endometritis of the third degree he defined as pyometra, and endometritis of the fourth degree as chronic endometritis with cystic degeneration of the ovaries. Nielsen emphasised that these conditions were the result of previous bacterial infection, and stated that they were most marked in the periods before and after the stage of *Br. abortus* infection when numerous abortions were occurring in a herd. He treated these conditions by the intra-uterine injection of iodine solution of various strengths, rivanol solution (an acridine derivative), or by expression of the corpus luteum, and compared the results obtained. His figures showed that following these treatments in the case of first degree endometritis, 86·7 per cent., 84·7 per cent. and 80·5 per cent. of pregnancies respectively resulted. The results after treatment with iodine and rivanol in cases of second degree endometritis were 67·1 per cent. and 69·7 per cent. pregnancy respectively. He stated that as the degree of endometritis advanced, the efficacy of treatment decreased.

Quinlan (1929) stated that chronic endometritis was the cause of 70 to 80 per cent. of sterility in cows in S. Africa.

Infertility in a herd is not static but is continually changing with the time of year, the introduction of new animals, the culling of infertile ones and changes in bulls, and it is usually difficult to form a picture of its actual incidence. The ideal situation would be 100 per cent. conception at first service, but this rarely, if ever, occurs; it is generally found that, with hand-service, 50 to 60 per cent. of animals conceive at first service, *i.e.*, a conception or service rate of 2·0 to 1·7. Similar results are obtained by artificial insemination. When animals which have not conceived are examined clinically, a proportion are found showing lesions of the genitalia responsible for the infertility, but many which are perfectly normal both at clinical and *post-mortem* examination and have been mated with normal bulls, do not breed. Some of them show regular oestrous cycles, others may "return" at six weeks, or between three and six weeks, but apart from this show no abnormality.

It has been shown (Walton, 1938) that a definite quantitative basis of fertility in animals exists. Apart from the necessity of living spermatozoa being deposited in the female genital tract, a certain minimum number must be deposited in the vagina to ensure that one of them reaches the Fallopian tube and fertilises the ovum. The number of spermatozoa reaching the site of fertilisation in the Fallopian tube depends on the number originally deposited in the vagina. After coitus the number of living spermatozoa reaching the Fallopian tubes gradually increases to a maximum, then, as no more spermatozoa arrive, those present die off, and the concentration in the tubes gradually falls to zero once more. If during the time that sufficient spermatozoa are present in the tube, a viable ovum is also present, fertilization occurs. The greater the number of spermatozoa ejaculated, the greater the chance of a fertile number coinciding with a viable ovum, even though large numbers are lost during transit from the site of ejaculation to the site of fertilisation.

Apart from there being spermatozoa in sufficient numbers, they must also be living, capable of making the journey through the uterus to the Fallopian tubes, and remaining viable till ovulation.

This may be expressed by a line of the form shown in Fig. 1.

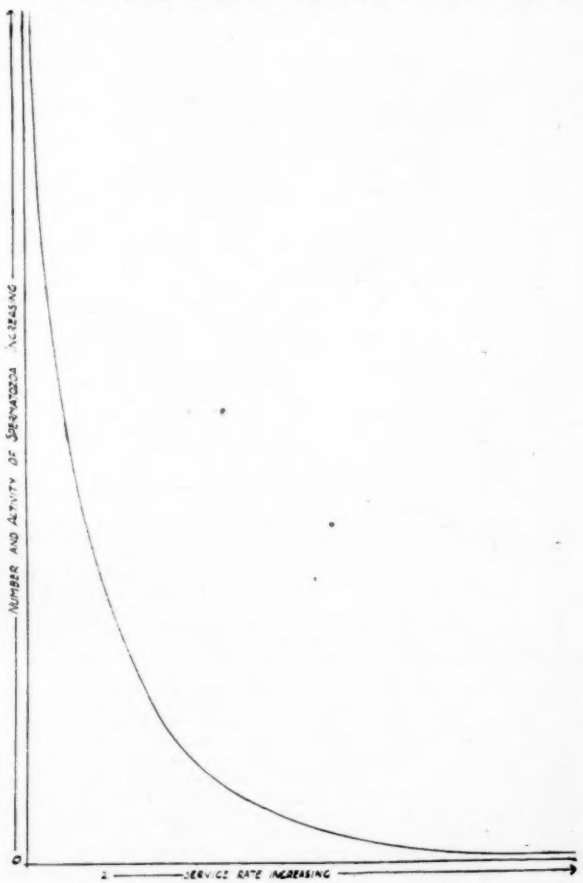


FIG. 1.—Relationship between quantity and quality of semen and fertility.

[By the courtesy of the "Journal of Agricultural Science."

* Presented to the meeting of the Derbyshire Division, N.V.M.A., held at Sutton Bonington, January 24th, 1945.

† Ministry of Agriculture.

The level of sperm production at which fertility begins to be reduced can be determined by counting the number of spermatozoa in diluted samples of semen in a haemocytometer (Macirone and Walton, 1938) and comparing the results with the fertility of the male. Various methods of grading the *quality* of semen samples according to the percentage of motile spermatozoa present have been suggested, based mainly on original Russian work. Other methods, depending on the survival of the spermatozoa during storage (Lardy and Phillips, 1940; Swanson and Herman, 1941) have been suggested, but are not easily applicable under field conditions. Walton and Edwards (1938) showed a correlation between the respiration rate of bovine spermatozoa and the fertility as expressed by the service rate, but this test can be carried out only in the laboratory. Using ram semen, the metabolism of which is very similar to that of bull semen, Webster (1938, 1939) correlated the *p*H of the semen on incubation with fertility, and Anderson (1942) stated that in sterile bulls the *p*H of the semen on ejaculation was higher than in normal animals.

When the fertility of 21 bulls of service rates varying from slightly above 1·0 to ∞ was compared with the density of the semen and the total number of spermatozoa produced at each ejaculation (Laing, 1945*a*), four samples of semen being collected from each animal on each occasion, it was found that when the density fell below about 500 million per c.c., and the total number below about 1,000 millions, fertility was markedly reduced. The service rate was also compared with the motility of the semen as observed at 37° C., under a 2/3 inch objective, the *p*H after incubation at 37° C. for one hour, and the percentage of abnormal spermatozoa present. It was found that animals of high fertility produced semen showing either a marked wave-motion, or a field packed with actively motile spermatozoa. Animals of lowered fertility produced samples showing a field of scattered spermatozoa with only weak oscillatory motion. In samples from sterile animals, all the cells were dead, or none were present. The *p*H of the semen of fertile animals on incubation fell to 6·7 or usually much lower; in animals of poor fertility or sterile animals, it changed very little, or not at all, from that at ejaculation. No connection could be found between the percentage of abnormal spermatozoa and fertility. The quantity and quality of the second sample was most closely related to fertility.

Under field conditions probably the best method of determining the quality of semen samples and the number of spermatozoa present is by the microscopical examination of thick films of semen under a 2/3 inch objective, taking care to ensure that the temperature of the sample does not fall much below 37° C. during the examination. With experience, a very good estimate can be made of both density and activity, and by combining this with the volume measurement, an estimate of the animal's fertility can be made. At the same time, several things must be borne in mind. First, in young bulls—from one to two years of age, the volume of semen may be low, 1 to 2 c.c., but with maturity it increases. Secondly, the time since the last service must be considered. Where a bull has been extensively used, the volume and density may be low, but these soon increase with rest if the animal is normal. Thirdly, in the case of some bulls, a single examination may not be reliable, and the semen produced may bear little relationship to the fertility of the bull. It seems that changes in the level of sperm production occur, but that these may be functional and the animal return spontaneously to normal.

It was found that, in the group of animals producing semen of density above 500 millions per c.c. with a total number of 1,000 million, and showing wave motion, the fertility might vary from a service rate just above 1·0 to one of about 3·5. From the quality and quantity of the semen, the animals could be divided into three groups—those with service rates between just over 1·0 and 3·5, those between 3·5 and ∞, and those which were sterile. This agrees with the work of Swanson and Herman (1941) who could not detect any significant difference in volume and density of the semen of ten bulls with service rates from 1·0 to 3·67, and of Anderson (1941) who stated that gradations of fertility between service rates of 1·18 and 2·71 could not be made on the basis of the semen characteristics, but that below a service rate of 2·71 the semen quality deteriorated.

But it was noticed that, in the higher fertility group, three animals which were not used for hand-service, but which were turned in with a cow or heifer during the whole period (about 12 to 48 hours) that she showed signs of oestrus, always produced better fertility results than those used for hand-service—service rates of 1·3 to 1·5 as against 1·9 to 3·5. It appeared that factors other than the quantity and quality of semen, caused variation in fertility in normal females. To test this hypothesis further, animals in the same herd where the majority of the original observations on the fertility of the bulls were made, were considered in two groups for a period of one year (Laing, 1945*b*). In one group, the "controlled" service group, the cows and heifers were served twice in succession as soon as they were noticed to be showing signs of oestrus, and not again in that oestrous period. In the second group, the "free-service" group, as soon as an animal showed signs of oestrus the bull was put with her, allowed to serve as often as he wished, and removed when no further signs of heat were noticeable. Samples of semen were collected monthly, for three months, from bulls in each group. It was found that in the natural breeding season in the late spring and early summer when oestrous periods are long, the animals of the "free-service" group were continually of higher fertility than those on "controlled" service. During December, January, February and March, when oestrus becomes shorter, the fertility in both groups was the same, being at a higher level than in the "controlled" group, and at about the same level as the "free" group in the warmer months. (Fig. 2.)

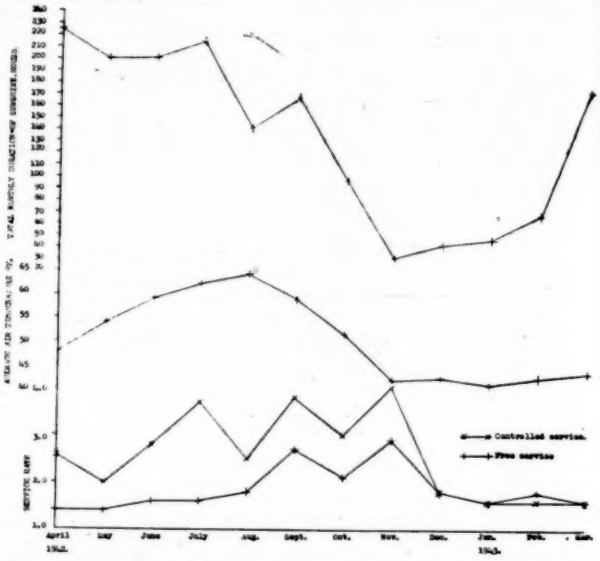


FIG. 2.—Two upper lines duration of sunshine and average air temperature. Two lower lines fertility in two groups of animals throughout the year as expressed by service rate (number of services per conception).

[By the courtesy of the "Journal of Agricultural Science."

There was no material difference between the quality of the semen produced by the animals in the two groups. From this it appeared that the better fertility in the "free" group was due to service nearer to the end of oestrus and thus to ovulation, which in cattle occurs 12 to 15 hours *post oestrum*, a little earlier in heifers than cows (Hammond, 1927; Gerasimova, 1938; Brewster, May and Cole, 1940; Nalbandov and Casida, 1942). This suggestion is supported by the much higher fertility obtained in herds where the bull always runs with the cows, than in herds where hand service is practised, and the improvement in fertility, originally demonstrated by the Russians, obtained by double-spaced insemination rather than a single insemination in one oestrous period.

Thus in cattle, as in other animals, it appears that basically, fertility depends on the chance of the spermatozoa, moving in the three-dimensional space of the genital tract, reaching the site of fertilisation, and also on their arriving there and being viable at the time that a viable ovum is present. The survival time of the spermatozoa being short, and that of mammalian ova being also limited (Pincus, 1936), the relationship of service to ovulation is important if full fertility is to ensue.

In order to determine as far as possible the actual survival time of the spermatozoa in the female genital tract, animals were inseminated at various times during oestrus, slaughtered, and the ova recovered from the Fallopian tubes 24 to 72 hours *post oestrum* to determine whether they had been fertilised (Laing, 1945*c*). This experiment was carried out on small numbers of animals, but was fairly strictly controlled, a standard estimated number of spermatozoa —1,000 millions (based on the total number ejaculated by fertile bulls) being inseminated intra-cervically, and the end of heat accurately determined to within 1·5 hours by mating tests with a vasectomised bull. It was found that inseminations made at times up to about 16 hours before the end of heat were all successful. At times earlier than this the ova recovered were not fertilised. After the end of heat, the results were somewhat irregular and seemed to depend on whether, if the animal was inseminated late, ovulation also occurred late enough for a sufficient number of spermatozoa to reach the ovum and fertilise it while it was still viable. This limited

survival time of about 16 hours, plus the interval between the end of heat and ovulation, confirms other work (Trimberger and Davis, 1943) carried out on large numbers of animals.

It thus appears that, while on the average the spermatozoa should be able to survive from service to ovulation, at all times of the year and particularly during the late spring and early summer months, normal cows and heifers may be served by normal bulls too early in oestrus for the spermatozoa to survive.

This must be taken into consideration in the diagnosis of fertility in the bull. Though the production of at least a certain minimum number of viable spermatozoa is the prerequisite of fertility, the full expression of this fertility depends on other factors which may operate. In use, a bull's fertility may vary between quite wide limits according to the manner in which he is used and according to the animals to which he is mated, and bulls should be considered as potentially of high fertility rather than certainly fertile even when used on normal cows.

On examining the ova recovered, it was found in some cases that though ovulation had occurred, the ova had developed for a time and then died. The succession of events at and about the time of oestrus in cattle can be expressed diagrammatically as in Fig. 3.

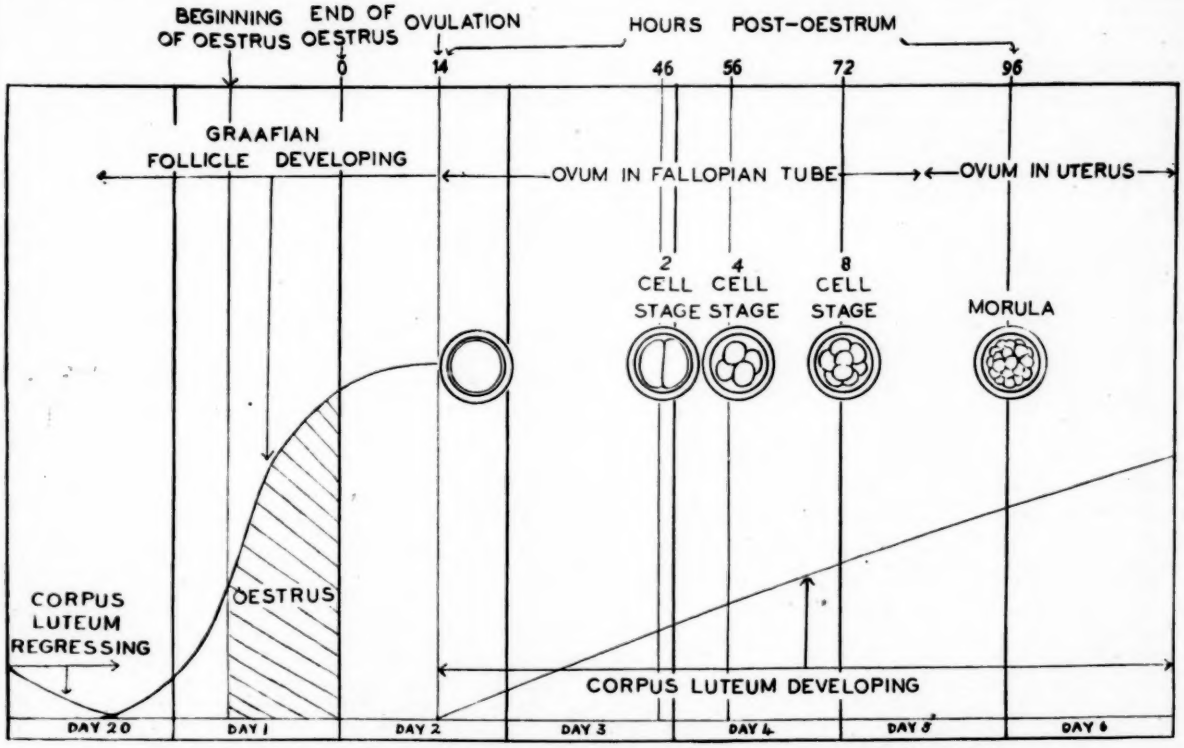


FIG. 3. DIAGRAMMATIC REPRESENTATION OF EVENTS AT AND ABOUT OESTRUS.

The corpus luteum regresses towards the end of the cycle, and as it becomes progressively less active, one Graafian follicle develops, and at the same time, the cow or heifer shows progressively more marked signs of oestrus, and finally for a time will accept service. The duration of this period may vary from six hours to 30 hours according to the time of year and other factors (Hammond, 1927). Signs of oestrus gradually disappear, and the animal will no longer allow service. At about 12 to 15 hours *post oestrum* ovulation occurs, the ovum enters the Fallopian tube and may be fertilised. By about 46 hours, if fertilised, it has divided to the two-cell stage; at about 56 hours the four-cell stage is reached, the ovum gradually passing down the tube, and dividing to the eight-cell stage at about 72 hours. Between 72 and 96 hours *post oestrum*, it leaves the Fallopian tube and enters the uterus at the 8- to 16-cell stage (Hamilton and Laing, 1944). The corpus luteum is meanwhile developing and, through the progesterone which it produces, is preparing the uterus to receive the fertilised ovum. The latter continues to divide to the morula and then the blastocyst stages and finally becomes attached by its membranes within the uterus at about 12 days *post oestrum* (Winters, Green and Comstock, 1942). During these early stages the developing embryo is free within the cavity of the uterus and depends for its nutrition on the yolk material it carries.

From the evidence of the fertilised but degenerate ova recovered, it appeared that early death and non-implantation of fertilised eggs might be responsible for a proportion of the infertility in clinically normal cows and heifers. In order to test this an experiment was carried out with a group of 24 normal beef heifers. These animals were kept in an open yard during the normal breeding season from May to August, 1944, and every eight hours a fertile bull was placed with them. Any animals in season were served. In addition they were inseminated with 1 c.c. of semen of high density showing wave motion, at some time during the last 16 hours of heat. At about 24 hours after the end of heat they were examined *per rectum* to ascertain whether ovulation had occurred. All animals ovulated. Six animals were killed as controls at various times between 24 and 72 hours *post oestrum*, the ova were recovered from the Fallopian tubes and were found to be fertilised in every case. The remaining 18 animals were tried every eight hours up to 25 days and if oestrus had not recurred, were slaughtered. Six of the 18 animals returned to service at the first expected oestrous period, were served, inseminated, killed and fertilised ova recovered from each. At *post-mortem* examination, of the remaining twelve, nine showed a normal embryo, three showed a uterus containing only foetal membranes with no embryo, but with an apparently normal corpus luteum of pregnancy in one ovary.

While this experiment is by no means conclusive, it seems to indicate that in a proportion of apparently normal animals the ovum may be fertilised and then die early so as not to influence the regression of the corpus luteum, oestrus recurring at the first expected time; or death may occur after implantation and the return of oestrus be delayed till some time beyond three weeks from the date of service. This may account further for the occurrence of infertility in clinically normal animals served by potentially fertile bulls, including those animals which return to service at six weeks, or between three and six weeks. Such returns are probably partly due to non-observance of the first heat, and those where the return occurs at between three and six weeks are explainable partly from animals having short cycles, 17 or 18 days, and returning at 34 to 36 days. But this cannot be the whole story, as such cases seem to occur in well-managed

herds at all times of the year, including the summer, when oestrus is well marked.

It is difficult to reconcile these causes of infertility in clinically normal animals—non-survival of spermatozoa and early death of fertilised ova with Nielsen's theory that the majority of normal-seeming animals which do not conceive are affected with first degree endometritis. But there seems no reason to suppose that many of these animals are abnormal, or that there is any chronic inflammation of the uterus. Nielsen never demonstrated that a chronic inflammation was present in first degree endometritis, or for that matter at any other stage. Quinlan did carry out histological examinations of the uteri of numerous animals slaughtered as incurably sterile and found chronic inflammations. But in all except one of his cases, there were clinically recognisable signs of endometritis or other lesions, such as cystic ovaries, responsible for the infertility. He demonstrated in one case only, chronic endometritis in a clinically normal animal.

Further, Nielsen gave no reason for the use of iodine as a uterine irrigant, and in fact obtained almost equally good results by using rivanol, or by expression of the corpus luteum. He stated that in herds not infected with *Br. abortus*, 90 per cent. of infertility was due to first degree endometritis, and it was in this type of case that he obtained the best results with uterine irrigation. The success of the treatment in his second and third degree endometritis was much lower.

In "second stage endometritis," where a clinically recognisable inflammation with an enlarged uterus, relaxed cervix and a muco-purulent discharge is present, uterine irrigation does seem to be of value in some cases. These cases are usually classified as being due to endometritis caused by non-specific organisms (N.V.M.A. Survey Committee, 1941) and are believed to follow infection at parturition, predisposed in many cases by *Br. abortus* infection. Nielsen gave no figures to support the view that the incidence of infertility is higher in herds infected with *Br. abortus*. All the herds in which he worked were infected. Lothe (1929) and Webster (1932) gave figures which appeared to show higher fertility in uninfected herds. But neither set of figures is satisfactory. No work appears to have been done to compare two herds, one infected, one uninfected, where care has been taken to ensure that in both groups bulls of equal fertility were used on females differing only by being infected in one group and not in the other. Also in this type of case (second degree endometritis) Nielsen did not differentiate *Tr. foetus* infection, which was not recognised when he made his observations.

The importance of bacterial infection in infertility has never been made clear, and though uterine irrigation with iodine appears to aid contraction of the uterus, its mode of action has never been demonstrated. It is unlikely to be bactericidal, and while it does appear to produce results in a proportion of cases, its use in the present state of knowledge is empirical.

Nielsen emphasised that chronic endometritis was the ***result*** of bacterial action, and that there was usually no active infection. But in some herds, endometritis may almost reach epidemic proportions, and once the possibility of *Tr. foetus* infection has been eliminated, it seems desirable in such cases to base diagnosis and treatment on a bacteriological examination of uterine discharge, rather than immediately commencing irrigation with iodine. In this way it may be possible to improve on iodine irrigation as a means of treatment and produce some method giving a higher percentage of success. More information is required on the occurrence of infertility due to bacterial infection. Hignett (1940) stated, though without giving details, that *C. pyogenes* can cause widespread infertility in a herd, and the Report of the N.V.M.A. Survey Committee (1941) stated that this type of infertility appeared to be increasing. Apart from this, little is known of the organisms which may be involved, although, given the right conditions, there seems to be no reason why any type of pathogenic organism should not invade the uterus. But again, little is known of the conditions involved. Yet it seems likely that better results would be obtained by carrying out treatment based on a differential diagnosis following bacteriological examination, rather than by immediate iodine irrigation of all cases of endometritis.

Amongst animals which appear normal, yet do not conceive, another known possible cause of infertility exists. Hignett (1940) stated that amongst animals on heavily limed land, manganese deficiency could exist and cause delayed ovulation. Nalbandov and Casida (1942) found that in two out of 72 oestrous periods studied in 22 cows, ovulation was delayed for from 47 to 104 hours, and in two other cases the follicle regressed and ovulation did not occur. While it is known that there may be considerable variation from the mean time of ovulation, it is not known whether this occurs regularly in particular animals, or whether it occurs commonly in groups of animals and causes infertility. The main difficulty in determining this under field conditions is in obtaining a good criterion of the end of heat. Signs of oestrus exhibited by cows are very variable, and the only really reliable method of determining the end of oestrus is by "trying" the animals with the bull to see whether they will allow service. If this is done, the time of ovulation can be determined by rectal examination and compared with the time of the end of oestrus to determine whether ovulation has occurred within the normal range. But, with this, the risk exists that either the follicle may be ruptured during examination, or that it may be damaged and luteinise without rupturing.

Outside the general problem of the animal which comes in season, but which cannot be got in calf, is that of the anoestrous animal, and the bull which refuses to serve. The information regarding sexual periodicity and the control of ovulation and oestrus has been summarised by Marshall (1936, 1941) and Hammond (1944). In outline, the control is from the environment of the animal, through the anterior pituitary to the ovaries.

In cows, in the majority of cases, though oestrus is not noticeable, a normal oestrous cycle is occurring. In heifers there is often complete absence of ovarian activity. Absence of oestrus in cows cycling normally is more a problem of management than anything else, and can be largely overcome by an observant stockman. The usual treatments of complete anoestrus are the injection of stilboestrol or pregnant mare serum, or where an oestrus cycle is occurring, the expression of a mid-cycle corpus luteum or the injection of stilboestrol. In bulls, the injection of large doses—3,000 to 5,000 i.u., of pregnant mare serum gives transiently successful results. But in all these cases, the actual cause of the condition is not known and we are merely treating symptoms.

Thus, at any one time in a sample group of animals forming a herd, there is always a proportion of clinically normal animals which are temporarily infertile, and a smaller group of permanently sterile animals. The first group are possibly made up of animals which have not conceived because of service too early in oestrus, some which have perhaps conceived but are infertile because of early death and non-implantation of fertilised ova, and some which are infertile from other causes which are not known. The second group consists of animals with congenital or acquired anatomical defects preventing conception—free-martins, animals with white-heifer disease, non-patent cervix, salpingitis, severe bursal adhesions, etc.

In such a herd, with its average fertility of 50 to 60 per cent. conception at first service, fertility may be reduced further through some other factor being superimposed—the use of bulls of low fertility, bacterial infection, *Tr. foetus* infection, and from other factors which are still obscure.

In the diagnosis of herd infertility, where some common factor appears to be operating throughout the herd and reducing fertility, all these points require consideration. Provided that there is no history or signs such as abnormal discharge, abortion, etc., indicating infection, it seems best, first of all, to eliminate the bull as a possible source of infertility.

Even though he is producing samples of semen of normal quantity and quality, it must be remembered that fertility can vary according to the method of management at mating and that all animals, though they do not conceive at first service, may do so later without treatment. A diagnosis of first degree endometritis and treatment by uterine irrigation does not appear to be indicated in such cases. Where animals show abnormal discharge, and there is a suspicious history, it is necessary to eliminate the possibility of *trichomoniasis* by examination of vaginal discharge for trichomonads and, once this has been done, bacteriological examination of cervical swabs may be necessary to obtain a correct diagnosis.

When animals are not showing signs of oestrus, the differential diagnosis of the immediate cause requires merely the consideration together of the history and the findings of a complete clinical examination.

It is thus apparent that there is no information more recent than 1934 on the incidence of infertility in this country, and that very little is known concerning its aetiology. It may be true to say that a large proportion of the infertility is due to the very artificial conditions under which dairy cattle are kept. But this is really no explanation, as what we should know is, in what respects the conditions which we provide for dairy cattle fall short of the natural environment, where cattle are much more fertile. The belief, based on Nielsen's work, that the major cause of infertility is endometritis following *Br. abortus* infection seems to require further examination as it has not been demonstrated that there is any chronic inflammation of the uterus in many cases, and it has never been conclusively shown that in herds affected with brucellosis there is more infertility than in those which are free. What appears clinically to be endometritis does occur, but the *rationale* of the present treatment by uterine irrigation with iodine is not definitely established.

Certainly no reliable information exists on the incidence of different types of infertility, or the differential incidence of infertility in different parts of the country and at different seasons of the year, except that anoestrus is believed to be more common in the north during the winter months. Little information exists on the effect

of the nutritional level on fertility, though anoestrus in particular appears to be a nutritional problem.

Although much can be done by the application of the knowledge at present available, *e.g.*, by regular pregnancy diagnosis in a herd, much more knowledge is required of the aetiology of infertility before a correct diagnosis can be obtained in every case and rational treatment applied.

References

Anderson, J. (1941.) *Vet. Rec.* **53.** 198.
———. (1942.) *Ibid.* **54.** 317.
Brewster, J. E., May, R., and Cole, C. L. (1940.) *Proc. Amer. Soc. Anim. Prod.* 1940. 304.
Economic Advisory Council's Committee on Cattle Diseases Report. (1934.) Cmd. 4591. H.M.S.O. 11.
Gerasimova, A. A. (1938.) *Probl. Zivotn.* No. 12. 126.
Hamilton, W. J., and Laing, J. A. (1944.) Unpublished.
Hammond, J. (1927.) Reproduction in the cow. Cambridge.
Hammond, J., Jr. (1944.) *Nature.* **153.** 702.
Hignett, S. L. (1940.) *Vet. Rec.* **52.** 361.
Laing, J. A. (1945*a*.) *J. Agric. Sci.* **35.** 1.
———. (1945*b*.) *Ibid.* **35.** 25.
———. (1945*c*.) *Ibid.* **35.** 72.
Lardy, H. A., and Phillips, P. H. (1940.) *J. Dairy Sci.* **23.** 873.
Lothe, H. (1929.) *J. Amer. vet. med. Ass.* **75.** 148.
Macirone, C., and Walton, A. (1938.) *J. Agric. Sci.* **28.** 122.
Marshall, F. H. A. (1936.) *Philos. Trans. B.* **226.** 423.
———. (1941.) *Biol. Rev.* **17.** 68.
Nalbandov, A., and Casida, L. E. (1942.) *J. Anim. Sci.* **1.** 189.
Nielsen, F. (1926.) N.V.M.A. Congress Handbook, 1926. 199.
N.V.M.A. Survey Committee's Report. (1941.) *Vet. Rec.* **53.** 1.
Pincus, G. (1936.) The Eggs of Mammals, New York.
Quinlan, J. (1929.) *Ann. Rep. Vet. Dir., S. Afr.* **15.** 833.
Richter, J. (1922.) Ursachen und Behandlung der Unfruchtbarkeit des Rindes, Berlin.
Swanson, E. C., and Herman, H. A. (1941.) *J. Dairy Sci.* **24.** 321.
Trimberger, G., and Davis, H. P. (19 3.) *Neb. Agric. Exp. Sta., Res. Bull.* 129.
Walton, A. (1938.) Folia Morphologica 8. 270.
——— and Edwards, J. (1938.) *Proc. Amer. Soc. Anim. Prod.*, 1938. 254.
Webster, W. W. (1932.) *Austral. vet. J.* **8.** 199.
———. (1938.) Proc. 7th Ann. Meeting of Sheep Farmers, Massey Agric. Coll., N. Zealand.
———. (1939). Proc. 8th Ann. Meeting of Sheep Farmers, Massey Agric. Coll., N. Zealand.
Winters, L. M., Green, W. W., and Comstock, R. E. (1942.) *Univ. Minn. Agric. Exp. Sta. Tech. Bull.* 151.

Discussion

Mr. W. F. Davison opened the discussion as follows: I would like firstly to congratulate Dr. Laing on his most interesting and masterly paper. His contribution to this breeding problem is by no means a small one. When I first heard its title I wondered, was it really true that at last we were about to learn something, no matter how little, of the aetiology of infertility in the bovine?

The many experiments to which Dr. Laing has continually referred are evidence of the amount of work he has done in the past few years and it is amazing the amount of progress he has made in so short a time.

He has not followed, as so many of us have done, the "Neilsen Way." The views of earlier workers he did not accept as they had not been backed by experimental proof.

Most of the experiments described have been on clinically normal material. Rather than attempting first of all to solve pathological cases he set himself to find out what actually happens in the seemingly normal animal, but almost immediately he is in the pathological field.

Dr. Laing's paper deals more with the physiological than the pathological side of infertility, consequently there is very little room for discussion by a field worker.

With his remark that "infertility in a herd is not static but continually changing, etc.", most of us would, no doubt, agree. Then how can one assess the incidence of infertility? The N.V.M.A. statement that "not more than 10 per cent. of all cases of sterility in average herds is due to physiological derangement" is in my opinion a gross understatement. From observations in the Midlands during the past year temporary infertility of this nature is a serious problem to the stock owner, the time elapsing from calving to conception varying from three to six months or more in numbers of cows in each herd. Oestrus may be seen from one to two months after calving but many then become suboestrus, especially towards the latter end of the year. Let me give you one example of an Ayrshire herd not far from here. Of 35 cows in milk 15 were very early in calf, and of 30 dry cows ten were pregnant. Many of the 30 had been dry for several months. The history was that a good number were served last January and had not been seen bulling since.

I should like to have Dr. Laing's views on this condition of "silent heat."

Neilsen's statement that infertility is much more common in herds infected with *Br. abortus* does not coincide with my observations. When the history included the presence of *Br. abortus* on the farm I did not pay much attention to it as I could see no difference in the types of infertility in an infected and non-infected herd; further, I could see no difference in the incidence. Of course, after an abortion with retention of the afterbirth one cannot expect such an animal to recover as quickly as a healthy cow after a normal parturition.

Dr. Laing has shown that this question of herd management is a most important factor in maintaining breeding efficiency, the economic importance of which should be brought home to the agricultural community. I am referring to the difference between the hand service conception rate of 2 to 3·5 as compared with the free service conception rate of 1·3 to 1·9.

If the survival time of spermatozoa be 16 hours from the end of heat and ovulation on the average does not occur till about 14 hours following heat, this makes the spermatozoa to be viable in the tract for about 30 hours. With these facts in mind it is surprising that results were disappointing when insemination was delayed until after heat if spermatozoa can reach the site of fertilisation in about three and a half hours. Would Dr. Laing explain this and also state what is the survival time of the ovum in the tube?

His experiment carried out on normal heifers to recover fertilised ova, or rather to find out what is actually happening shortly after service is most interesting and, no doubt, throws some light on why so many apparently normal animals return to service. The experiment is watertight and leaves no room for criticism.

That such a large proportion, 50 per cent., should fail to settle at the first service surprises me. The question is, why? Dr. Laing does not agree with Neilsen's view that these types of cases are suffering from endometritis of the first degree. I should like to know on what grounds he refuses to accept the view. Has he any histological proof? It might be argued that conception at the next service is sufficient evidence that no endometritis is present. Against this would implantation not be liable to break down again, or the fertilised egg die early? Even if conception is successful at the following service, would it not be possible that an endometritis of a very transient nature was present during the previous diestrous period?

In future I shall be more careful about diagnosing pregnancy on the 21st day as a result of Dr. Laing's findings in the three heifers showing only foetal membranes without an embryo, together with a normal corpus luteum. I shall not attempt to speculate on the aetiology as to why the embryo dies out so early, nor will I attempt to guess as to what happens to the foetal membranes which contain no embryo or as to the damage to the endometrium which they may cause. If Dr. Laing cannot give us the answer to-day we will all be looking forward to his next paper in which I have no doubt it will appear.

Mr. R. H. Smythe: He must first congratulate the essayist on his modern views; his paper was not intended to uphold the fallacies of the past. He commenced by saying that it was generally considered that the chief cause of infertility was endometritis of various types and that the treatment usually adopted was irrigation of the uterus with solutions of iodine of various strengths. He gathered from Dr. Laing's subsequent remarks that he did not altogether subscribe to this view. He quoted the N.V.M.A. Survey Committee, 1941, as his authority for this statement. He (Mr. Smythe) thought it was now generally accepted by those best calculated to know that infection played a very minor part in the causation of infertility and that endometritis was one of the least common causes. It was exceedingly unfortunate that the Survey Committee accepted from the very first the theory that infertility was bound up with endometritis; it was even more unfortunate that, working on this hypothesis, they should have been led to believe that this condition, if it existed, could be counteracted by weak iodine irrigation and it was an actual tragedy that the Committee failed to listen to practical field workers who attempted to point out their error before it was too late. The adoption of wholesale iodine irrigation as a cure for all ills of the female reproductive apparatus might have been founded on lack of knowledge current at the time—the *continuation* of the practice would be fraudulent eyewash, inexcusable, and a glaring example of dangerous empiricism. In the light of our present knowledge, even yet not very extensive, the Survey Committee should issue amended advice as to treatment. We need no longer attempt to delude ourselves, nor our clients, by showmanship and the administration of a *placebo*.

He felt that the original belief that endometritis of the first degree was so prevalent, was based on the assumption that normal "uterine milk," present in appreciable quantity in at least 75 per cent. of healthy uteri was, in reality, pus. The majority of cases in which the uterus developed hyperplasia were more probably due to nervous dysfunction, associated with hormone imbalance. In this condition, the uterus was definitely more susceptible to bacterial invasion, but endometritis, arising in this way, was not a serious complication. The normal uterus had marked powers of resistance to infection and the secondary endometritis cleared up as soon as the primary cause had been removed—but not until that time—in spite of irrigations.

Until two years ago he was fortunate in living close to a large abattoir and he examined the genital organs of every cow slaughtered for barrenness. He also examined the organs of a large number of cows with a normal breeding history, and he came to the conclusion that almost every abnormality, commonly supposed to cause infertility, could be found in the genital tract of regular breeders, with the exception of tuberculous salpingitis, which was quite common and an almost certain cause of sterility.

He also found that 75 per cent. of infertile cows showed no macroscopic lesions whatever. When *post-mortem* examination could be so inconclusive, one began to mistrust he infallibility of those practitioners who glibly diagnosed every case of infertility by rectal examination.

Several years ago he endeavoured to find out whether iodine irrigations had any beneficial effect other than local and possibly remote stimulation. He divided 200 cases of infertility, of unknown aetiology, into three groups; the first he treated by intra-uterine irrigation, the second by vaginal irrigation and the third group was untreated. The cases treated by vaginal irrigation showed slightly better results than those treated by injections into the uterus but, in the control group, the results were almost identical. Any improvements observed were usually due to (*a*) the time factor—most cases recovered untreated if given time, unless some serious condition such as salpingitis existed, and (*b*) stimulation of the autonomic nervous system.

The quack of his boyhood days, who treated infertility by removing the quid of tobacco from his cheek and rubbing it violently into the clitoris, was merely 40 years ahead of his time. His harvest of fees might not have been so great but he did less harm and possibly slept with an easier conscience than the modern panel practitioner.

He was glad that Dr. Laing had drawn attention to the viability of the ovum. When one considered the conditions which must be fulfilled in order to secure and maintain conception, it was amazing that any female animal ever succeeded in producing living young. Throughout the whole course of gestation, the lonely wanderings of the impregnated ovum, for a whole fortnight, within the uterus, dependent for its sustenance upon its own yolk, struck one as being the most perilous period. So many factors, associated with the abnormal development of the modern milk cow, might contribute to this danger. The ovaries of the cow might be handicapped functionally, and possibly developmentally, by the fact that the mammary glands had attained precedence; the anterior pituitary might be more concerned with the production of lactogenic hormone than with oestrogenic; the nourishment of the body as a whole might be insufficient to cope with the demands made upon it and the ovum—if ever developed and freed from the ovary—set out upon its travels, like an unwanted child on a Polar expedition after a much larger boy had stolen his sandwiches!

He thought that the essayist had somewhat over-emphasised the part played by the bull in causing infertility. The male animal remained far less affected by the stress of modern demands than the female, although glandular deficiencies might be transmitted to an animal of either sex of the same breeding. In actual practice he found that complete sterility in the bull was comparatively rare, apart from anatomical causes; intermittent infertility was fairly common. A bull, judged by his sperm count, might be infertile at night and fertile next morning; he might be infertile at his first service and fertile at his second. This was particularly evident if he had been rested some weeks. He had had the unfortunate experience of condemning a bull as infertile, as a result of successive sperm examinations, only to find that the cows last served by him proved to be in calf. In future he would never condemn a bull until he had given him a month at pasture.

Housing of bulls was, in general, the great handicap to fertility and explained to some extent the better results obtained when a bull ran out with the cows—although he had recorded the case of a bull kept constantly in a dark house, never exercised and seldom fed, which retained a high level of fecundity.

He agreed with the essayist that service late in oestrum was desirable. He had seen conception result in heifers artificially inseminated 24 hours after the cessation of oestrum. In the insemination of bitches he got the best results by operating as soon as the bitch first refused the dog, at the end of oestrum. Early inseminations usually failed.

He was glad that Dr. Laing had raised the question of delayed ovulation. He had experience of four Friesian cows which ovulated at periods up to a week after

the cessation of the period of " heat." He treated these with manganese injections and all conceived. He was not claiming that manganese had anything to do with the results. He would like to know how common was that condition?

What did the essayist consider the best method of collecting semen for microscopical examination? Owners of valuable bulls were apt to look askance at the artificial vagina and the bull himself might share the owner's feelings. Collection from the vagina was unsatisfactory. His usual method, when his agility and lumbago permitted, was to press a microscope slide on to the tip of the penis as soon as the bull dismounted, taking care to get a sample showing a milky appearance. This had been satisfactory in many cases but depended a great deal on the behaviour of the bull.

Mr. E. Wilkinson: The Derbyshire Division were very honoured in having the privilege of a visit and paper from Dr. Laing and he wished to thank him most sincerely for the great amount of work which the preparation of his paper had entailed. Neilsen stated that infertility was much higher in brucella-infected herds than in uninfected herds. Without, unfortunately, having any data to support the view, one was constantly finding herds where infertility was common and which were also heavily infected with *Brucella abortus*. This was most marked in several herds during the first year of the Control Scheme—many cows were quite sterile as a result of non-attention following abortions. It had been routine procedure in his practice to irrigate all aborted or " cleansed " cows about three weeks after parturition and he *believed* that the number of permanently sterile cows had been very greatly reduced. Neilsen also stated that as the degree of endometritis advanced the efficiency of treatment decreased. This also would appear to be in line with experience in his area. In any case, he believed that one could say that the successes in old-standing cases of infertility were much less than in those treated after no more than three or four services. One thing was certainly outstanding in his mind —that infertility was much commoner in herds affected with *Brucella abortus* or *Trichomonas foetus*.

Dr. Laing stated that ovulation occurred 12 to 15 hours post-oestrum. He also stated that inseminations up to 16 hours before the end of " heat " were successful. He then said that the survival time of the sperms was 16 hours—did he mean 28 to 31 hours?

Dr. Laing used the phrase " but with an apparently normal corpus luteum of pregnancy in one ovary "—could one make any differentiation between a corpus luteum of pregnancy and a corpus luteum of dioestrus, clinically?

The essayist had said that signs of oestrus were very variable and the only really reliable method of determining the end of oestrus was by trying the animals with the bull to see whether they would allow service. In this connection, could Dr. Laing give any opinion on the value of the " oestroscope "?

Did Dr. Laing mean that anoestrus in *cows* (which he said were usually treated with stilboestrol) should be treated at any particular time in the cycle? And, if P.M.S. was used, was one to understand that this should only be used at about the time of ovulation when the corpus luteum had completely regressed?

With regard to the probability of *T. foetus* infection being present in the herd, their experience was that where one examined the herd for pregnancy and one found, say, two or three cases of pyometra out of about 20 examined, with a concomitant high number of infertile cows, the chances were heavily in favour of Trichomoniasis being present, and that if one persevered, one would eventually be able to demonstrate *T. foetus* microscopically.

While one must agree with Dr. Laing that the rationale of the present treatment by uterine irrigation was very much in question, one must observe that there was not at the present time any reason why one should discard it—any more than why one should have discarded udder inflation for " milk fever " before the discovery was made that the condition was accompanied by a hypocalcaemia.

One *must* agree that prolonged anoestrus in heifers was almost invariably found in cattle subsisting on a low nutritional level—much more rarely in well-fed animals. It would seem, however, that this type of infertility was going to be more troublesome this year than formerly and there appeared to be many more cases also among one-calf cows than had been met with before.

Mr. I. G. Shaw thanked Dr. Laing for his excellent paper and hoped that his late arrival, for which he apologised, did not invalidate any of his ensuing remarks.

He asked the essayist as to whether Neilsen's good results following iodine irrigation were due to the rather long time that animals were given to conceive following irrigation.

In the Midlands it was his experience that where three iodine irrigations were indicated it was the practice to give three such at weekly intervals. If conception did not occur after such treatment then, its repetition was not often productive of conception within a reasonable time.

He thought that the bacteriological information obtained from taking samples of mucus or discharge from the anterior vagina or cervix with a spoon and a speculum gave better results than cervical swabs. He pointed out the technical difficulty of taking a cervical swab and enquired of Dr. Laing his technique. It was his opinion that excepting *Brucella abortus* most bacteria found in the genital tract were probably secondary invaders.

The term " endometritis " was in wide use. Since Neilsen's definition of it we did not seem to have advanced very far in our knowledge of its cause, diagnosis, pathology and treatment. The conditions obtained in the herds examined by Neilsen might differ from those that occurred in this country.

The expression of the corpus luteum was a recognised form of treatment for various disorders of the genital tract but it was often used empirically. He did not fully agree with its expression to the extent that it was carried out to-day. The dangers from expressing what was in most cases a perfectly normal structure were not always apparent. Damage to the ovary from adhesions was not uncommon as well as death of the subject from shock or haemorrhage. He recalled one bunch of heifers that were in a condition of suboestrus. The expression of the corpus luteum was followed by cyst formation in the ovaries. After a period of rest they subsequently became pregnant without further treatment. He had been led to believe that Mr. Davison had diagnosed pregnancy in heifers at three weeks. He personally would not like to commit himself as early as this but had been able to diagnose pregnancy in cows as early as the 25th to 28th day provided that he had been able to observe the animals very closely since conception.

Rectal palpation was necessary to ascertain the state of the genital system but it was rather too subjective for accurate work and he thought that if often repeated it had a deleterious effect.

In his district, the most common condition, or lack of it, was a picture of complete clinical normality except that the animals had an ovarian cycle of 21 to 60 or more days and yet did not conceive if bred. Could not the cause of it fit in with some of the conditions that Dr. Laing had indicated that afternoon?

The use of pregnant mares' serum as a treatment for the condition of anoestrus in heifers was very disappointing. It seemed as if, in the majority of cases where this condition was observed, the cause had some relation to the nutrition of the animal. It appeared probable to the speaker that if more were known regarding the growth phases of the organs of the bovine, with special respect to the reproductive organs, then the rearing of animals from birth to sexual maturity would be seen in a new light. Was it possible that if the developing animal was deprived of a fully adequate diet the reproductive organs were one of the first to suffer—often irreparably so?

It had been shown by various workers that the suckling of the calf had beneficial actions on the dam with special regard to the involution of the uterus. From the speaker's observations he was of the opinion that delayed involution of the uterus could lay the reproductive system open to further disorders. Further, an adequate *post-partum* rest period was essential to efficient reproduction.

The speaker had to admit that in the majority of cows and heifers examined by him, and using the known and available aids to clinical diagnosis, no clinical abnormality could be found, nor could an accurate diagnosis be made as to the cause of the condition. It would appear that the lack of reproductive efficiency in the bovine was due to a deranged physiology rather than a definite pathological condition. He had very little faith in the few drugs and hormones available for the so-called treatment of genital disease. There was only one line of treatment in which at the present time he had faith and that was the operation of the time factor and all that it involved. Lactation was the culminating process in the cycle of reproduction—if undue emphasis were placed upon it, as at the present time, then the normal balance would be upset, leading to the well-known troubles.

The Reply

Dr. Laing: Mr. Davison had asked about silent heat. There did not seem to be any definite information on its cause. But it appeared as if the animals were returning to the natural condition where the non-pregnant female did not show oestrus outside the normal spring and summer breeding season. The conditions were not being supplied which would prevent this in the dairy cow, as we did not know what they were.

The irregular results of the inseminations made *post-oestrum* had been explained on the time relationship between insemination and ovulation, but this was only a hypothesis without very much to support it. There seemed no reason to think that the survival time of bovine ova was very different from other mammalian ova, *i.e.*, only a few hours.

Mr. Davison had asked also whether the experimental animals in which fertilised ova had apparently not survived might not be affected with a transient endometritis. There was no evidence available to suggest that this was so or not. But there seemed no reason to select endometritis rather than any other pathological condition.

The statement (by Mr. Smythe) that examination of samples of semen was not a reliable method of diagnosis of infertility in the bull, did not agree with his experience. Also he thought that collection of semen by means of the artificial vagina was usually satisfactory.

It was not known how long after the end of heat animals could be inseminated successfully. The usual limit stated was six to eight hours, but there was probably considerable variation from animal to animal.

In reply to Mr. Wilkinson's question, he did not think that it was possible to distinguish a late mid-cycle corpus luteum from one of pregnancy, but that it was sometimes possible to distinguish a mid-cycle corpus luteum from a corpus luteum of pregnancy. He had no experience of the oestroscope, but did not think that it could be used for an accurate diagnosis of the beginning and end of oestrus. In anoestrum it was doubtful whether ovulation followed stilboestrol treatment unless the treatment was carried out just before normal oestrus. When P.M.S. was given at the end of the cycle, there was a risk of causing multiple ovulation. He did not wish to suggest that, because iodine treatment was empirical, it should be discarded. There was nothing else to offer. The points which he did wish to make were that it was empirical, in many cases there was perhaps no endometritis, and that if further investigations were carried on, an improved method of treatment might be evolved.

The statement regarding the approximate survival time of the spermatoza should have been 28 to 31 hours.

In reply to Mr. Shaw, he was unable to say whether results obtained by iodine irrigation were due to the period of rest allowed.

REACTOR DISPOSAL PROTEST

A protest against the practice of disposing of cattle which react to tuberculin testing by transferring them to other herds was made at a meeting of the Pembrokeshire Livestock Committee. Mr. David Perkins pointed out that reactors were simply moved from tuberculin-tested herds and placed in non-designated herds.

The Veterinary Inspector (Mr. R. O. H. Massey) said the point was appreciated by the Ministry. The only alternative way to deal with reactors was slaughter, and in war-time that was far too expensive a policy from the point of losing cattle. With the end of the war the question would be settled.

It was reported that of 5,236 tuberculin-tested cattle examined in the last quarter 21 were reactors.

* * * * *

Illustrated papers recently have featured illustrations of the 23 puppies (15 males and eight females) born to Lena, a Pennsylvania hound, owned by Commander W. Newbold Ely, of Ambler, Pa., a remarkable feature being that all were whelped on one day. The number itself is three short of what is believed to be the maternity record for all breeds of dogs, which was created by the foxhound bitch Dido, owned by Mr. W. B. F. Johnstone, of Virginia, U.S.A. The 26 puppies were born in June, 1923. A litter of 23 was born to an Irish setter, also in America, and a Great Dane is recorded as having had 21.

* * * * *

Bermuda is making headway in its campaign against tuberculosis among the Colony's dairy cattle. A recent Agricultural Report says that the tuberculosis test was made compulsory for all cattle and in place of the annual test, arrangements were made for the testing of all cattle at six-monthly intervals and, in herds where disease was found, at three-monthly intervals until two consecutive tests showed no reaction. This more frequent testing combined with the slaughter of reactors and cleaning of infected premises is proving effective and, if continued through the next two or three years, should result in the incidence of tuberculosis falling to a very low figure.—*Colonial Office News Service.*

THE VETERINARY RECORD

June 9th, 1945

RESTRICTIONS ON SALE OF BIOLOGICAL PRODUCTS

WE reproduce in this issue part of an editorial article published in the April number of the *Journal of the American Veterinary Medical Association*.

In 1941 proceedings were instituted by the U.S. Department of Justice in which the Associated Serum Producers Inc. and others were charged with conspiracy to restrain trade in the sale and distribution of animal medicines. It was complained in the charges laid against the defendants that the policy of selling products " only to veterinarians who are graduates of approved veterinary colleges " prevented stock owners from immunising their own animals. There were also other indictments. The prosecution contended that the defendants were violating the Sherman Act of Congress directed against trusts. The evidence given by experienced veterinarians was important in converting the Court to the view that such measures were necessary to safeguard the animal community and were calculated to promote the interests of the stock owner. After an extended trial the defendants were acquitted.

The widespread use of swine fever virus and immune serum to combat swine fever had aroused a desire in the veterinary profession in America to restrict a potentially dangerous product from being used by people who were not competent to appreciate the grave hazards entailed by indiscriminate employment. Swine fever has been controlled hitherto in large measure successfully in U.S.A. by the skill of practising veterinarians under the careful supervision of the Bureau of Animal Industry.

The bar self-imposed by manufacturers on the unrestricted sale of biological products has been accompanied by an educational campaign to impress stock owners with the need for close co-operation with qualified veterinarians to secure the maximum benefit. Needless to say, accurate diagnosis is essential to obtain satisfactory results from the use of the various biological products in controlling the diseases for which they are recommended, and the veterinarian alone is capable of advising an owner in this respect.

We congratulate our colleagues in the U.S.A. on the successful outcome of their efforts ; failure would have been serious.

Some commercial firms in this country have shown a readiness to co-operate with the profession along the lines successfully followed in America. This growing tendency is highly gratifying. Naturally many stock owners feel that they have a right to treat their own flocks and herds, if they wish to do so, and will be inclined, therefore, to resent any restrictions placed upon the distribution of remedies. Nevertheless, it is estimated that thousands of pounds are wasted every year on biological products which are misapplied. Furthermore, in the hands of the inexperienced, these products may easily do more harm than good. It is our bounden duty, therefore, to enlighten firms disposed to sell tuberculin, virus-containing preparations, etc., to any stock owner willing to buy them, that it is in the interest of all concerned to co-operate closely with the veterinary profession.

To commemorate the forthcoming jubilee of the agricultural department, King's College, Newcastle, a special fund is being opened in County Durham, to be used for research and development.

CLINICAL COMMUNICATION

Two Unusual Cases

D. RICHARDSON, M.R.C.V.S.
Bath

Case I: Pyometra in a Cart Mare

Subject.—Medium weight chestnut cart mare, 15 years, in good condition. Had never been to the stallion.

History.—Had shown no signs of being in season for the last 20 months. Had never had a day's illness that could be remembered except ten days previous to my visit, when one morning she had been dull and listless, but this had soon passed off and in 48 hours she appeared quite well again and was back at work.

Symptoms.—Dull and off feed in the morning; signs of acute colic in the afternoon. I saw the mare at 4.30 p.m. and she was in acute abdominal pain with all its associated symptoms. Rectal examination revealed great distension of the whole of the uterus; the os uteri was completely closed. Pyometra was diagnosed Attempts were made to relieve the condition, but the mare died at 6 p.m. that same afternoon.

Post-mortem Examination.—This revealed great distension of the uterus which contained a darkish grey pus. Each horn measured 49 inches along its greater curvature from the apex of the horn to where it joined the body. Circumference at the middle of each horn, 30 inches. Circumference of body of uterus, 47 inches. The weight of uterus and its contents was 121 lb.

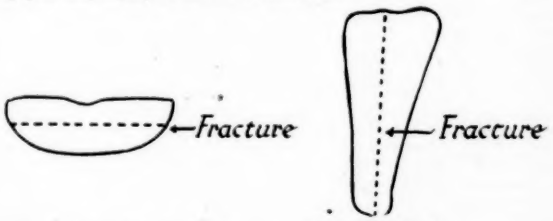
Case II: Fracture of the Os Suffraginis

Subject.—Grey thoroughbred mare, five years old. Had been raced as a two-year-old. Now being used for hacking. Very quiet in traffic. In fair condition.

History.—The owner had been leading the mare down the road one afternoon with a girl up in the saddle, when suddenly the mare had gone acutely lame on the off fore and stopped, refusing to put the foot down. With difficulty he got the mare back to the stable about 200 yards away.

I was asked to visit the mare on the following morning. On arrival I found she was in great pain, holding the off fore foot free of the ground. On examination I diagnosed a longitudinal fracture of the os suffraginis. The mare was shot.

Post-mortem Examination.—I had the bone carefully boiled out, and found that there was a longitudinal transverse fracture extending from the middle of the upper articular surface downwards and backwards to the posterior edge of the lower articular surface. There was complete absence of any exostosis or ostitis to suggest any previous injury or disease of the bone.



End on view of upper extremity of Os Suffraginis.

Lateral view of Os Suffraginis.

Farmers Welcome Discussion Groups.—The expansion and popularity of the Discussion Group movement among farmers and Young Farmers' Clubs is one of the most interesting developments brought about by the war. This furthering of knowledge by the exchange of ideas and experiences is a healthy sign, especially when it is remembered that in the past farmers have always been considered rugged individualists. Agricultural movements have always been slow travelling. This fault, however, was often forced upon farmers by themselves. For years, notwithstanding the efforts made by one or two interested in farm development, any improvement made by farmers was considered as his " trade secret." This state of affairs lasted longer than is generally known, thus delaying the dissemination of some improvement beneficial to the industry. Now, however, all this is changed, agricultural research of all kinds comes by the quickest possible route to all farmers. Farmers, too, have changed. They work, not merely for themselves, but for the benefit of farming as a whole. Anyone who has attended a well run Discussion Group realises this fact in the change of outlook.

ABSTRACTS

[Further Studies on Bloat. Mead, S. W., Cole, H. H., and Regan, W. M. (1944.) *J. Dairy Sci.* **27**. 779.]

Previous work has led the authors to put forward the hypothesis that bloat, such as occurs when cattle graze green lucerne, is due to insufficient fibrous material in the diet; lack of fibre leads to depression of the movements of the rumen and to suppression of belching so that gases formed in the rumen cannot escape. The experiments described in this paper were designed to investigate this hypothesis further.

Four cows were fed on a ration of concentrates and alfafa hay for two periods; during one period the hay was fed in its normal condition and in the other it was finely ground. All four cows bloated repeatedly during the latter period but only one animal bloated under the normal diet. In trials in which green alfalfa tops were fed with concentrates bloat was frequent and severe in one animal, occasional and mild in two and absent in the fourth animal. Animals grazing lucerne were in addition given barley straw at night; the quantity eaten was measured and although not great was appreciable, but it had no effect in reducing the incidence of bloat. Other observations on the incidence of bloat showed that there is great variation in the incidence not only between individual animals but in the same individuals. As the food was identical for all animals the authors conclude that individual variation exists in the degree of movement of the rumen, the possibility of variation in the balance of the flora of the rumen is not considered.

A. T. P.

* * * * *

[Ovine Surgery in Pure-bred Flocks. Britton, J. W. (1944.) *Cornell Vet.* **34**. 320-328. (2 figs., 7 refs.).]

Attention to the individual sheep is perhaps only warranted in pure-bred flocks and it is with this premise in mind that the author discusses surgical problems encountered.

Satisfactory anaesthesia is obtained by the administration, per os, of chloral hydrate at the rate of 15 grammes per 100 lb. body weight. Anaesthesia is complete in from 15 to 20 minutes and lasts one to 12 hours. Where necessary it is supplemented by local infiltration using a 1 per cent. procaine solution.

Abscesses and sepsis (*Corynebacterium ovis* and *C. pyogenes*) of the retro-pharyngeal and submaxillary lymph glands result usually from shearing wounds. They heal readily after incision. A disease of some moment is chronic ovine laryngitis which occurs in ram lambs being heavily grain fed. The lesion is a small chronic abscess in the arytenoid cartilage with extensive surrounding oedema. Respiratory distress gives rise to the term "roaring bucks." The mortality rate, due to suffocation, is practically 100 per cent. Tracheotomy, although giving immediate relief, is of little value. More recently 6 grammes of sodium iodide given intravenously in 50 c.c. of water has given more encouraging results.

Cryptorchidism, inguinal hernia, orchitis and urinary calculi are affections met in the male genital tract with abscess formation of the scrotum, testicles or epididymus as the most common. Urinary calculi are generally localised to the vermiform appendix or the lower end of the urethra. In the former, amputation of the appendix is indicated, while in the latter situation, urethritis, cystitis and nephritis are sequelae and in most of these cases slaughter is the policy.

In the female prolapse of the vagina prior to lambing and prolapse of the uterus due to dystokia are infrequently met. Any such cases are eliminated from the breeding flock. Bands of fibrous tissue across the vagina have been responsible for cases of dystokia. There is some evidence to show that this condition may be hereditary. Caesarean section was successfully performed on three ewes. In two, dystokia due to malpresentation of the foetus was the indication while the third had a unilateral rupture of the prepubic tendon. The site of incision was the right flank.

Anal and rectal prolapse are common in black faced breeds of sheep. The former is more frequently encountered and the treatment consists of a purse-string suture inserted around the anus. Recurrence in from one to six months is the rule. True prolapse of the rectum carries a poor prognosis. Amputation has been practised in six cases. Five ewes died two to three days after operation.

Acute impaction of the rumen is common in ram lambs on barley stubble, especially when taken off green food rather suddenly. Good results are obtained by rumenotomy under local anaesthesia. Five per cent. saline is given intravenously to combat dehydration and re-establish peristalsis. Foreign bodies in the nature of "hair" or "felt" balls in the alimentary tract are apparently common in Californian flocks. Most of these obstructions are confined to the abomasum, but occasionally the small intestine is the site. Surgical intervention including resection of intestine gives excellent results. Intestinal surgery has been performed by the author on ten sheep with only one fatality.

Gangrenous mastitis due to staphylococcal infection is seen at lambing time. In unilateral cases amputation of the teat gives adequate drainage and appears to confine the disease to one side. Amputation of the digit, in advanced cases of footrot, involving the pedal joint, is performed by means of a wire saw under local or general anaesthesia. Entropion in lambs is regarded as being hereditary and affected animals are eliminated.

The author comments on the rapidity with which wounds in sheep heal provided they remain free from parasites.

C. F.

* * * * *

[Studies on Bovine Gastro-intestinal Parasites. IX.—The Effects of Nematode Infections during the Larval Period. Mayhew, R. L. (1944.) *Cornell Vet.* **34**. 299-307.]

Mayhew points out that, during the course of experiments on nematode infections of calves, quite serious effects were often produced by the larvae between the time they gained entrance into the digestive tract of the calf and the adult period of life when eggs are produced. Since the damage done during this part of the nematode life-cycle does not seem to be generally recognised by practitioners and livestock owners, the author believed it worth while to record his own observations which, in his opinion, should re-emphasise the importance of preventive measures. Having given a brief review of the literature on this aspect of nematode infection, Mayhew gives details of the results of experimental infections with *Haemonchus contortus*, nodular worm and other nematode larvae of 12 calves which were obtained soon after birth to preclude natural infection and later raised under parasite-free conditions until they were exposed to infective material. In six animals it was found that the gain in weight was very much reduced during the prepatent period of the nematode life-cycle while regular increases again occurred during the adult life of the worms. *Post-mortem* examination of six calves, which died, showed that their death could be directly attributed to the effects of parasitism during the prepatent period. Mayhew also points out that the severe anaemia which develops during the prepatent period may lower the general resistance of the calf to other diseases such as pneumonia.

J. N. O.

REVIEW

["Physiology of Farm Animals." By F. H. A. Marshall and E. T. Halnan. Third Edition, 1945. Cambridge University Press. 18s.]

The appearance of a new edition to this standard work is welcome and, as one would have anticipated, reasonable amendments have been made to the text. On the whole the subject matter has been brought up to date, whilst the length of the book has been kept within a reasonable compass. This work still remains one of the best short accounts of the physiology of farm animals.

At times rather too much detail is given—which is not explained in the book—when some more general statement would be more readily assimilable by the reader. As an illustration of this small criticism one may cite the statement on page 43 referring to nicotinic acid: "It is an essential component of codehydrase 1 and codehydrase 2." It is true an attempt to explain codehydrase is given in a short footnote, but surely from the point of view of the reader of this text it would have been better merely to have stated that nicotinamide is an essential component of certain oxidising enzyme systems, especially as the authors do not attempt to give a picture elsewhere of the processes involved in cellular metabolism. A further illustration of the unnecessary inclusion of detail comprises the reference to the diet used by Evans in his preliminary work upon vitamin E. On the whole, however, the authors manage to put most of the matter in a good general background, often placing old facts in more appropriate modern setting. For example, in discussing carbon dioxide they bring out the fact that this waste product acts similarly to a hormone in that it is produced in various organs, is transported by the blood, and acts specifically upon the respiratory centre.

Although the work contains much useful data it is not sufficiently advanced for veterinary students and veterinarians, but it should continue to be one of the standard works for agricultural students. It should have an appeal to qualified veterinarians who wish to bring their fading knowledge of physiology into line with current facts and theories.

Weekly Wisdom

No one was ever the first to say anything.—O. G. S. Crawford.

REPORT

[UFAW (The Universities Federation for Animal Welfare). Eighteenth Annual Report for year ending September 30th, 1944. War-time address: 284, Regent's Park Road, Finchley, N.3. (Finchley 1079.)]

The scientific and veterinary interest of the work of UFAW is growing rapidly. The present report contains several examples of that combination of scientific outlook and considerate but commonsense regard for animals which represents real animal welfare to the veterinary surgeon. A main feature is the preparation of a handbook on the care and management of the smaller laboratory animals, the chapters of which have been written by veterinary, medical and biological research workers in Great Britain and the U.S.A., and the publication of which will take place as soon as paper supplies become available.

Further progress is reported on the question of a Wild Life Authority. Draft proposals have been laid before the Parliamentary and Scientific Committee, while four representatives of UFAW (Sir Peter Chalmers Mitchell, Dr. E. Hindle, Major C. W. Hume and Professor A. N. Worden) met a sub-committee of the British Ecological Society (Professor A. G. Tansley, Capt. C. Diver, Messrs. O. W. Richards and Charles Elton) at the House of Commons to discuss a common policy of action. [Communications from those interested are requested.]

On the educational side a lecturette on dogs has been written by Miss Joan O. Joshua, M.R.C.V.S., while Professor Warmington, Dr. Kirkman and others have continued their lectures to schools and adult audiences. Over a million of the economy labels bearing a coloured design by Fougasse have been sold. UFAW has been regularly represented by Major C. W. Hume and Professor A. N. Worden at meetings of the Parliamentary and Scientific Committee, while contact has been maintained with ASLIB (Association of Special Libraries and Information Bureaux), the Institute for the Study of Animal Behaviour, the British Ecological Society, the Conference of Educational Associations, certain animal welfare organisations and the Hawksley Society, which co-operated in the publication of an article on domestic rabbit-keeping by Mr. W. King Wilson, of the Harper Adams Agricultural College.

Activities which have been noted in previous reports continue to receive attention, while the financial situation appears good. New committee appointments include that of Mr. Anthony Self, of the Royal Veterinary College. Miss F. Jean Vinter, M.D., continues as Secretary.

Veterinarians—who, with medical men and university graduates, are all eligible for membership of UFAW—should communicate with the Secretary at the Federation's war-time address.

QUESTIONS IN PARLIAMENT

Veterinary Surgeons

Professor Gruffydd asked the Minister of Agriculture if he will state the number of veterinary surgeons employed by his Department in England, Wales, Scotland and Northern Ireland, respectively.

Mr. Hudson: As the answer contains a number of figures I will circulate it in the Official Report.

Following is the reply:

At present 260 whole-time veterinary officers of the Ministry of Agriculture are stationed in England, 55 in Scotland and 44 in Wales: but individual officers are moved as conditions require. In addition, there are 847 veterinary surgeons in private practice who serve as part-time officers of my Department, and of these 596 are in England, 175 in Scotland and 76 in Wales. My responsibilities in matters of animal health do not extend to Northern Ireland.

* * * * *

Attested Herds

Mr. G. Strauss asked the Minister of Agriculture whether he can state the number of herds that have been continuously on the register of attested herds during the last five years; and in how many of these herds there has been no reactor to the tuberculin test within this period.

Mr. Hudson: I cannot give the precise information asked for without further detailed examination of the records, but perhaps it will be sufficient for the hon. Member's purpose to say that 3,187 herds in England and Wales have been continuously on the Register of Attested Herds from December 31st, 1938, to the end of 1944, and that in 2,053 of these no reactor to the tuberculin test has been recorded during that period.

Motor-Car Driving Licences

Viscount Hinchingbrooke asked the Parliamentary Secretary to the Ministry of War Transport whether a printed notice of renewal will in future be sent to persons in possession of motor-car driving licences in the same manner as is done for game licences.

Mr. P. Thorneycroft: When the licensing authorities are again able to undertake the work, I hope it will be possible to restore this convenient practice, which was suspended because of the need for economy in man-power and paper.

* * * * *

Warbles

Sir R. Tasker asked the Minister of Agriculture if he will reintroduce the Compulsory Warble Dressing Order; and take steps to see that the Order is vigorously applied.

Mr. Hudson: No, Sir. I have issued a notice advising owners, where practicable, to use a suitable dressing on cattle visibly infected with warbles, but I do not propose to reintroduce the compulsory Order this year. In any case, the season during which treatment can usefully be given ends in a few weeks.

* * * * *

Milk Recording (Compulsion)

Lady Apsley asked the Minister of Agriculture if, in order to obtain reliable statistics for breeders of dairy cattle, he will institute a scheme of compulsory milk recording.

Mr. Hudson: Under present conditions I am afraid it would not be practicable to institute a compulsory scheme.

Lady Apsley: Will the Minister appreciate how very necessary this is in the interests of milk production, and how important it is for milk producers?

Mr. Hudson: Yes, but I am sure the Noble Lady will appreciate that great progress has been made. Shortage of labour is the limiting factor in extending what she and I would like to see done.

Brigadier-General Clifton Brown: Is the Minister aware that since the Milk Marketing Board took over the administration from the milk recording societies, there has been a considerable reduction in milk recording herds, while at the same time a considerable increase has been shown in the Milk Marketing Board's accounts for milk recording? Will my right hon. Friend look into the whole matter?

* * * * *

Dangerous Dogs

Sir J. Lucas asked the Secretary of State for the Home Department if he will circularise magistrates, pointing out that confinement to a recognised quarantine kennel might be an alternative to an order for destruction, which carries a penalty of £1 per day for delay, involving in some cases continuing fines out of all proportion to the offence.

Sir D. Somervell: Under the existing law magistrates have power to deal with a dangerous dog either by making an order for it to be kept by the owner under proper control or by making an order for it to be destroyed. The suggestion made by my hon. and gallant Friend is, in effect, that a third course should be available to the Courts. This would require legislation, and I am not satisfied that such legislation is necessary.

LIVESTOCK FOR LIBERATED COUNTRIES

At a recent meeting in London of the European Committee of Unrra under the chairmanship of Sir Frederick Leith-Ross, Commander R. G. A. Jackson, Senior Deputy Director-General, reported on the delegation from headquarters to the European Regional Office of responsibility and authority for operations in Europe. The object of the new dispositions was, he said, to simplify the organisation and accelerate the speed of its operations.

The Committee took various decisions on recommendations made by its technical sub-committees on agricultural, fisheries, veterinary and other subjects. The most important of these related to the question of securing livestock—particularly cattle and horses—for liberated territories from the ex-enemy countries. The sub-committee on agriculture stated that suitable breeds for many of the liberated countries could, in many cases, be obtained only from ex-enemy countries.

The Committee agreed that the Administration should consult the military and other established authorities with a view to securing information on any surplus of live animals in ex-enemy territory from which the relief requirements of liberated territories might be met.

* * * * *

At a luncheon given by the Scientific Instrument Manufacturers' Association, Professor I. A. Heilbron, scientific adviser with the Ministry of Production, pleaded for the setting up of a Ministry of Science as a State department.

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

June 9th.—Meeting of the Biochemical Society, at the University of Glasgow, 11.30 a.m.
June 13th.—Meeting of the Editorial Committee, N.V.M.A., 36, Gordon Square, W.C.1, 2.30 p.m.
June 15th.—Meeting of the Welsh Branch, N.V.M.A., at Shrewsbury (Council Chamber, The Castle), 2.30 p.m.
June 15th.—Meeting of the Society of Women Veterinary Surgeons at Wilmslow, Cheshire.
June 18th.—Meeting of the Overseas Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 2.30 p.m.
June 20th.—Meeting of the North of England Division, N.V.M.A., at Darlington (Imperial Hotel), 2.30 p.m.
June 21st.—Summer Meeting of the Central Veterinary Society (*change of date from June 7th*) at the Ministry's Veterinary Laboratory, New Haw, Weybridge, 2.15 p.m.
June 21st.—Annual Meeting of the Dumfries and Galloway Division, N.V.M.A., at Dumfries (Station Hotel), 2 p.m.
June 25th.—Meeting of the Farmers' Club, Kingsway Hall, Kingsway, London, W.C.1, 2.45 p.m.
June 27th.—N.V.M.A. Committee Meetings in Edinburgh: Subcommittee on First Aid Handbook, 10.30 a.m.; Organising, 12 noon; Appointments, 2 p.m.; Finance and General Purposes, 3 p.m.
June 28th.—N.V.M.A. Meetings in Edinburgh: Joint Parliamentary and Veterinary Officers and Public Health Committee, 10.30 a.m.; **Council Meeting,** 11.30 a.m.
June 28th.—R.C.V.S. Written Examinations.
June 29th.—R.C.V.S. Written Examinations.
June 29th and 30th.—Meeting of the Pathological Society of Great Britain and Ireland, at Cardiff (Dept. of Pathology, Welsh School of National Medicine). Particulars on application to Mr. J. H. Dible, Department of Pathology, British Post-graduate Medical School, Du Cane Road, London, W.12.
July 2nd.—R.C.V.S. Oral Examinations begin.

* * * * *

R.C.V.S. Council Election Result

The following result of the Royal College of Veterinary Surgeons' Council Election was declared at the annual general meeting of the Royal College, held at 10, Red Lion Square, London, W.C.1, on Tuesday last :

Name	*Votes*
H. W. Dawes	1,050
T. Dalling	990
R. E. Glover	848
S. J. Motton	820
W. M. Mitchell	749
W. R. McKinna	741
Esmond Brown	737
F. Beckett	730
(The above-named were declared elected)	
J. D. Peele	707
T. Hicks	610
R. F. Montgomerie	588
H. Burrow	573
A. W. Stableforth	567
D. S. Rabagliati	563
R. C. G. Hancock	554
W. S. Gordon	551
J. J. Dunlop	543
H. Gillmor	536
H. Scott Dunn	469
J. Campbell Hill	446
Miss Joan O. Joshua	429
Mrs. K. H. Everett	217

Representative of Eire

It was also announced that Mr. L. N. Gleeson, of Waterford, had been elected as the representative of Eire on the Council.

Scheme for the Control of Certain Diseases of Dairy Cattle in England and Wales

The Executive of the National Veterinary Medical Association, after agreement with the National Farmers' Union and the Ministry of Agriculture, recommends that undertakings under the Scheme for the Control of Certain Diseases of Dairy Cattle in England and Wales, which are due to lapse and which both parties are willing to renew on the basis of existing agreements, should be extended for twelve months.

This would mean that in respect of two or three year undertakings, the 10 per cent. and 20 per cent. rebates respectively will continue to operate.

Meanwhile, discussions between the three bodies concerned will take place and any alterations which may subsequently be agreed will be announced.

* * * * *

PERSONAL

Birth.—Bradley.—On May 27th, 1945, to Marguerita, wife of John F. Bradley, M.R.C.V.S., High Street, Fishguard—a son.

. . . . .

Forthcoming Marriage.—Lawfield—Holdstock.—The engagement was announced on May 27th, 1945, of Capt. F. G. Lawfield, R.A.V.C., only son of Mr. and Mrs. H. C. Lawfield, of Cambridge, and S/O J. M. Holdstock, W.A.A.F., daughter of Mr. H. Holdstock, of Loose, Maidstone, Kent.

. . . . .

Death.—Boyle.—On May 31st, 1945, at "Northfield," Belper, Bessie, dearly beloved daughter of Capt. and Mrs. B. P. Boyle.

* * * * *

R.C.V.S. OBITUARY

George, Herbert H. S., Dunstable, Alberta, Canada. Graduated London, December 16th, 1901. Died April 4th, 1944.

Hunt, Frederick Wellesley, C.B., C.M.G., C.B.E., Brigadier A.V.S. (Retd.). Graduated London, May 10th, 1893. Died December 23rd, 1944. (Notification just received.)

[A memoir of Brigadier F. W. Hunt, whose death we record with deep regret, will appear in an early issue.]

Neale, William Walter Raymond, O.B.E., Major R.A.V.C. (Retd.). Graduated London, July 11th, 1899. Died March 19th, 1945.

O'Leary, Henry, "Sunnyside," Vernon Avenue, Clontarf, and 171a, Parnell Street, Dublin. Graduated Dublin, July 26th, 1923. Died May, 1945; aged 48 years.

Raymond, Francis, C.I.E., Colonel I.C.V.D. (Retd.). Graduated London, January 5th, 1877; Fellowship, November 25th, 1885. Died May 17th, 1945.

Worrow, Harry Huckle, Eynsford, 2, Ridgeway Gardens, Westcliff-on-Sea, Essex. Graduated London, March 27th, 1896. Died May 29th, 1945.

Wright, Henry Stewart, Temple End, High Wycombe, Bucks. Graduated London, December 16th, 1913. Died June 1st, 1945; aged 53 years.

Mr. H. S. Wright's death, which occurred with tragic suddenness, will be deeply mourned by his colleagues in the profession. On Friday evening of last week, at about 8 o'clock, he arrived at a local farm to calve a cow. He was about to commence when he dropped dead in the cowshed, due, it is believed, to coronary thrombosis. Mr. Wright leaves a widow, to whom profound sympathy will be extended in her loss.

Mr. Henry O'Leary, M.R.C.V.S.

Mr. Henry O'Leary, M.R.C.V.S., whose death we record with much regret and who passed away in a private nursing home in Dublin, was for many years a well-known veterinary surgeon and a racehorse owner.

Born in Macroom, he was educated at St. Colman's College, Fermoy, and qualified at the Veterinary College in Dublin in 1923. He took a keen interest in the turf, and was Hon. Veterinary Surgeon to Leopardstown and Baldoyle racecourses. He owned a number of horses, among them Sterling Duke, which was second in the first Red Cross Plate; while Workman, in the year of his Grand National victory, was under his professional care. Mr. O'Leary was also interested in greyhounds.

Some years ago Mr. O'Leary was appointed a member of the Irish Veterinary Council. He was an ex-President of the Veterinary Medical Association of Ireland. He leaves a widow and six children, to whom deep sympathy is extended in their bereavement.

The Late Mr. Richard E. L. Penhale, J.P., M.R.C.V.S.

Mr. R. E. L. Penhale, whose death we announced with deep regret in our last issue, passed away suddenly at his home at Great Torrington on May 13th. Eighty-six years of age, he was the eldest surviving member of an old veterinary family.

After graduation in 1881 Mr. Richard Penhale was in practice in North Devon for over 50 years.

He was interested in public work, and was a Justice of the Peace for many years and Mayor of the Borough of Torrington in 1911. An esteemed member of the Western Counties Division, N.V.M.A., Mr. Penhale attended the meetings of the Society fairly regularly up to the time of his retirement. His wife, who pre-deceased him some years ago, was a Magistrate for the County of Devon up to the time of her death.

* * * *

Professor G. W. Clough

[An Appreciation]

Hidden by the stirring events of recent months, the passing of a teacher, for whom I and many of my contemporaries had great liking and respect, has been almost unnoticed.

Professor Clough's considerable scholastic attainments have been dealt with in a previous issue of the *Record*; it is as a teacher, humorist and sportsman that many of us will remember him. A quiet speech and unassuming manner concealed a competent and patient teacher and a fund of simple humour and dry but never biting sarcasm. He was a welcome guest at students' smoking concerts, and in my day was a keen follower of college hockey. One year he attended every match in the London University "Cup" competition, and proved no mean "touch-line" supporter. Few of us present will forget the final that year, when he cast professional dignity to the wind, threw his bowler hat in the air and shouted whenever we scored a goal.

There was no professor in my time for whom I had a greater respect; he was dignified, learned, yet unpretentious; above all he was human.

N. H. H.

* * * * *

A CHALLENGE AND A VERDICT

"The recent trial before a federal grand jury of the Government's anti-trust suit against a group of manufacturers of 'animal medicines and supplies,' who choose to sell their products only to qualified veterinarians, was an important event in American veterinary history," states the *Journal of the American Veterinary Medical Association* in the course of an editorial article, headed as above, in its issue of April, 1945,* and continues: "In a strictly legal sense, the issue concerned only an alleged conspiracy in violation of the Sherman Act. In a truer and broader sense, the whole principle of competent animal disease control was challenged and, by virtue of that fact, the entire veterinary profession was on trial. On this point, there is agreement among all who look beneath the surface of the action for the motives of those persons and groups, not officially identified, who instigated the strange attack.

"By its very nature, the whole fabric of the trial was interwoven with the strong threads of veterinary science and its essentiality to a healthy, prosperous livestock economy. The story of veterinary medicine could be told only in part, but its inherent soundness, wholesomeness, and influence upon the daily lives and welfare of our people were convincingly portrayed by the defendants and the expert witnesses for the defence. When to this was added the logical testimony of the defendants as to why they had individually adopted and maintained a sales-to-veterinarians-only policy, the prompt action of the jury in returning a verdict favourable to the defence is readily understood.

"The fact that the defendant companies and individuals, all of whom for many years have taken a strong stand in behalf of a sound system of disease control in farm animals, were acquitted very quickly may minimise the true significance of the case. By and large, these ethical business and professional men are disposed to 'let bygones be bygones' and to get back to the vastly more important work of producing for and serving the best interests of livestock growers and the country's needs for foods of animal origin.

"If the outcome had been different, there is little doubt that certain elements would have interpreted it as a negation of the need for an orderly veterinary service and would have heralded it as a licence to exploit further the diseases of farm animals. Moreover, in the popular mind, a verdict adverse to the defendants would have reflected against all our veterinary institutions alike—accredited educational and research facilities, the field of qualified practice, and the state and federal livestock sanitary services which are responsible, officially and legally, for the control of infectious animal diseases. What all of this would have meant in terms of encouraging medical quackery with its ultimate dire costs to livestock owners is appalling to contemplate.

"In fairness to the prosecution, it should be stated that the Government attorneys did not seriously debate the fundamental principle of competent diagnosis, treatment, and control of animal diseases by graduate veterinarians. The fact that the prosecution, during the trial, elected to narrow the issue to the production, distribution, and use of anti-hog-cholera serum and virus is significant in this respect. . . . .

"The veterinary profession should ever be grateful that a jury saw so clearly the reasonableness of the individual defendant's policies. The verdict will be far-reaching in the future advancement of formal veterinary education, clinical veterinary medicine, and official disease control services. The American farmer, the accredited segments of the veterinary service, and the other firms pursuing the same policy as the defendants, ought to congratulate themselves for the strong stand taken by the companies and individuals in the face of the enormous personal cost of their defence.

"At the same time, there is a very clear responsibility upon every individual in the veterinary profession and upon every segment of the veterinary service. Satisfaction over the outcome must be counterbalanced by a determination to work even harder to maintain the respect for the principles of veterinary medicine patent in the conclusive answer given in this case. Nor should the outcome delude anyone into believing that it will spell the end of animal disease exploitation by those who short-cut scientific methods of disease control, and who ignore the pattern by which success in this field has been achieved by accredited veterinary agencies in the past 60 years. Accepting the verdict as a heartening moral victory is not enough; only by sticking to, and fighting for, the fundamental issues involved can the veterinary profession discharge its responsibilities to the people and the industry it serves."

* The significance of these proceedings and their outcome forms the subject of our own editorial article this week.—*Editor.*

* * * * *

MILK POLICY

Commenting in its issue of April 21st on the recent debate on milk which took place in the House of Lords, the *Lancet* says, with reference to the general recommendations put forward by Lord Bledisloe:—

"These are admirable proposals, but from the medical standpoint they have two limitations which were noted later in the debate by Lord Moran and the Earl of Listowel. In the first place, they are long-term recommendations: wise and statesmanlike as they are, they do not meet immediate needs. Secondly, like many other suggestions made by non-medical speakers in the debate, they seem to assume that a clean milk produced from attested herds is by that token a safe milk. It is not so. Again, although it was frankly recognised that some 40 per cent. of our cattle are infected with tuberculosis, some speakers comforted themselves with the cheerful reflection that only 0·5 per cent. or so passed tubercle bacilli into the milk. This complacency is unwarranted, for, as report No. 246 from the Medical Research Council in 1942 showed, practically all bulked milk representing the produce of 20 herds or more must be infected with living tubercle bacilli. In his recent book, 'The Pasteurisation of Milk,' Professor G. S. Wilson points out that the available figures suggest that 'Accredited milk is just as heavily infected with tubercle bacilli as ungraded milk; and that Tuberculin Tested milk is just as heavily infected with *Br. abortus* as ungraded milk, if not more so.' One must reckon in addition with other sources of milk contamination from human beings, such as the direct infection from scarlet fever, septic sore throat, or diphtheria, as well as the dangers from patients or carriers who are excreting typhoid, dysentery, or other disease-producing organisms which may be carried through imperfectly cleaned fingers.

"No doubt the aims of all who took part in this interesting debate were to support the supply of milk that would satisfy the consumer—a clean safe milk of high nutritional value—but the methods recommended were necessarily evolutionary and slow. The needs of the people are immediate. Suppose, by way of illustration, that a certain city finds that its water supply is continuously polluted; it is no answer for the local authority to say that it intends to construct a new reservoir—the public rightly demand that in the meantime the water shall be made safe. The milk supply stands in a similar predicament. On all sides it is admitted that milk is being contaminated to a greater or less degree: It is in fact unsafe and should be made safe without delay. Contaminated water can be made safe by chlorination; contaminated milk can be made safe by pasteurisation."

* * * * *

ADDRESSES OF DISEASE-INFECTED PREMISES

Swine Fever:

Aberdeenshire.—Woodside, Memsie, Fraserburgh (May 28th).

Beds.—Wilbury Farm, Hitchin Road, Stotfield, Arlesey (May 28th); White House Farm, Begwary, Eaton Socon (May 29th).

Berks.—Manor Farm, South Hinksey (June 1st).

Glam.—"Berwyn," Cefnbyrle Road, Colbren, Neath (May 29th).

Glos.—"Whistlefield," Bemfurlong, Staverton (June 4th).

Leics.—10, The Green, Mountsorrel, Loughborough (May 29th).

Lincs.—Hareby House Farm, Hareby, Spilsby (June 4th).

Northants.—"Suttersey," New Road, Whittlesey, Peterborough (May 28th); Sunnyside, Guilsborough, Northampton; Leys Field, Brixworth Road, Holcot, Northampton (May 30th).

Surrey.—Catteshall Lane, Godalming (June 4th).

Warwicks.—Hermitage Farm, Longfellow Road, Stoke, Coventry (June 1st).

Wilts.—38, Stone Lane, Lydiard Millicent, Swindon (May 29th); Piggery, Collins Lane, Purton, Swindon (June 1st).

Yorks.—Castle Farm, Stapleton, Womersley, Pontefract (May 28th); Upperthorpe Road, Killamarsh, Sheffield (May 29th); Wiske Field, Great Smeaton, Northallerton (June 1st); Chapel Hill Farm, Balne, Goole (June 4th).

* * * * *

AGRICULTURE IN THE "CARETAKER" GOVERNMENT

In the formation of his "caretaker" Cabinet Mr. Churchill has paid a compliment to agriculture by retaining at his post the Minister of Agriculture, Mr. R. S. Hudson. The essential character of farming as warranting no interruption in policy during the political interregnum is thus recognised. It is also to be noted with satisfaction that he is included in the new Cabinet.

The Duke of Norfolk also retains his post as Joint Parliamentary Secretary to the Ministry of Agriculture, but his colleague, Mr. Tom Williams, resigns, and is replaced by Mr. R. Donald Scott, who has been Ministerial liaison officer in the North of England.

Ministry Appointments

The Minister of Agriculture and Fisheries has made the following appointments:—

Mr. Charles Nathan to be Second Secretary of the Ministry in succession to Sir Donald Vandepeer, whose appointment as Permanent Secretary of the Ministry was recently announced.

Mr. Reginald Hector Franklin to be Under-Secretary of the Ministry.

* * * * *

THE BRITISH COUNCIL AND AGRICULTURE

An agricultural department which will be advised by a panel presided over by Mr. J. A. Scott-Watson, Chief Education and Advisory Officer, Ministry of Agriculture, has been set up within the Science Department of the British Council, and Dr. W. T. H. Williamson, B.Sc., F.R.I.C., F.R.S.E., adviser in agricultural chemistry to the University College of South Wales and Monmouthshire, has just taken up his duties as director of the new department.

Since the formation of the science department of the British Council in 1941, it has been found that many of the enquiries from abroad relate to agriculture. Prominent agricultural scientists have made visits abroad under the auspices of the British Council and provided reports on the agriculture of some foreign countries. It will be one of the functions of the new department to follow up these reports and to provide expert information on how far the agricultural needs of the countries concerned can be provided for by the nations of the British Commonwealth. It will present the achievements of British agriculture to other countries and keep them supplied with up-to-date information on all advances in practice and science.

* * * * *

LEGAL NOTES

Failure to Castrate or Slaughter Rejected Bulls.—At Whitminster (Glos.) Police Court on May 24th, Cecil Walter Raymond Lockyer, of Manor Farm, Frampton-on-Severn, was summoned for having failed to comply with an order of the Ministry of Agriculture to have two bulls either castrated or slaughtered. He was fined £50 in respect of each bull and was ordered to pay £2 12s. 8d. costs. Three months ago when Lockyer was similarly summoned in respect of the same animals he was fined £40.

Supt. F. J. Williams said in September last Lockyer submitted four bulls to the Ministry for licensing, but after the animals had been examined only one was licensed, the others being rejected on the grounds that they were of inferior conformation and unlikely to produce suitable progeny. Lockyer did not avail himself of the opportunity to appeal until it was too late, and on two occasions warnings were sent to him that unless he complied with an order made either to castrate or slaughter the bulls, he was rendering himself liable to prosecution and a penalty of £3 daily for each of the bulls.

As he did not comply he was prosecuted on March 1st and was fined £20 in respect of each bull. After that he was again warned that further proceedings would be taken if the order were not obeyed, but when a livestock officer of the Ministry visited the farm on April 11th he found that Lockyer had still not obeyed the order. The Superintendent added that Lockyer had rendered himself liable to a further penalty of £252 in respect of each bull.

William Dodson, livestock officer for the Ministry, gave evidence, and P.S. Thomas said when he interviewed Lockyer on April 21st he made a statement in which he said: "I have my own definite reasons why I have not had the bulls castrated or slaughtered. Let the history of the bulls decide." He added that he knew he was right in not dealing with the bulls as ordered.

Contending that the bulls were very well bred, Lockyer said it would mean the frustration of his creative efforts if the bulls were not used for their proper purpose. He argued that there could be no offence in his keeping the bulls as they were. No adequate reason had been given for the castration of the bulls.

The Chairman said that defendant could not keep bulls without a licence and the Bench, finding the offence proved, imposed the penalty intimated above.

Lockyer was also summoned for having failed to give notice that he had a cow suffering from tuberculosis emaciation and for this he was fined £5 and costs (£1 15s.).

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion of, or having received the approval of the N.V.M.A.

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

* * * * *

SULPHONAMIDES IN GENERAL VETERINARY PRACTICE

Sir,—The excellent paper by Dr. Brownlee on this subject published in the *Record* of May 19th and the discussion appearing in this week's issue are timely.

A vast body of pharmacological and clinical research has been condensed into a readable and assimilable form, and at last one has an opportunity of relating one's clinical experiences thereto.

I have long been impressed with the necessity of supplementing sulphonamide therapy by attempts to increase the humoral resistance of the patient with biological products such as vaccines and sera of proved efficiency. Having read and pondered the implications of Brownlee's survey of the subject I am more than ever convinced that the practitioner must reinforce the action of sulphonamides by the intelligent use of biological products whenever they are available; only by such action will he reduce the percentage of disappointing cases encountered in practice, and maybe by so doing achieve success in some which are potentially drug-resistant.

Yours faithfully,

"Fairfield," T. A. R. Chipperfield.
Crowborough Hill, Crowborough.
May 26th, 1945.

* * * * *

PROSPECTS IN THE PROFESSION

Sir,—It seems strange to me that with 50 years' practical experience Mr. Mayall should select such a caption as "The Slave Market" and yet object to graduates being told what their future prospects will be.

My letter did not refer merely to assistants, but to all who seek to make their livelihood with a Diploma, in this country, or the Colonies.

The new generation have a right to full enlightenment, and as a complete outsider I wrote, knowing that the ambitions of students of to-day vary greatly from those of half a century ago.

Yours faithfully,

Woodcote, Pound Hill, Malcolm Park.
Crawley, Sussex.
June 2nd, 1945.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Parasitic Mange*	Sheep Scab	Swine Fever
May 1st. to 15th. 1945...	1	3	—	—	43
Corresponding period in—					
1944 ...	8	—	—	—	52
1943 ...	16	—	—	3	15
1942 ...	12	1	—	5	23
Total Jan. 1st to May.15 1945	44	76	5	37	418
Corresponding period in—					
1944 ...	94	19	5	58	266
1943 ...	134	10	5	97	203
1942 ...	126	12	26	110	164

Note.—The figures for the current year are approximate only.
*** Excluding outbreaks in Army Horses.**